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# EUROPEANS, SCIENCE AND TECHNOLOGY

## Survey findings



# Editorial

## Public science

Is science's bright future already behind it? To ask the question in this way is certainly overdramatic, if not inappropriate. The results of the latest Eurobarometer survey presented in this issue show that science continues to enjoy a large measure of confidence among Europeans. Given society's dependency on research and technological development, it is difficult to justify any reductions in investment and support for these activities.

Yet a number of findings should give pause for thought as they perhaps suggest darker days ahead.

First there is the fact that sciences are failing to attract young people. It is not so much their interest in scientific subjects or professions that is in question as the image of science studies per se. They are seen as too dry. Unlike previous generations, young people prefer to set their sights on other horizons.

Also worrying is the gap opening up between science and society. An astounding 45% of people interviewed see themselves as neither informed about nor interested in science. However, as always, surveys of this kind throw up their fair share of contradictions and paradoxes. For, at the same time, Europeans seem to have a good understanding of the importance – and opportunities – of science and, more surprisingly, of research policy (see the impressive approval rating for scientific co-operation and the coordination of research).

Finally, the results highlight the limits of information. When it comes to genetically modified organisms (GMOs), for example, opinions depend little on the level of knowledge or education of the persons interviewed. People are simply not convinced of the utility of GMOs.

In terms of scientific culture, the results of a short quiz show little change compared with 1992 which, depending on your point of view, can be greeted with relief or disappointment. Only one question – concerning dinosaurs – elicited a notable 10% increase in correct answers. This is no doubt a Jurassic Park effect, which shows just how much impact products for mass consumption can have on the image and knowledge of science. For better or for worse.



## The survey: facts

The data presented in this special edition of *RTD info* were obtained in an opinion poll conducted between 10 May and 15 June 2001 in the 15 European Union Member States. The survey was requested by the Research Directorate-General and follows a similar 1992 Eurobarometer survey on the same subject.

16 029 persons were interviewed, making an average of about 1 000 in each country,\* on the basis of a representative sample of the popula-

tion aged 15 years and over. The figures for the European Union as a whole are a weighted average of the national figures.

It is important to note that when respondents were free to give several answers to the same question the total percentages can exceed 100%.

(\* With the exception of Germany (1 000 in the former Länder and 1 000 in the new Länder), the United Kingdom (1 000 in Great Britain and 300 in Northern Ireland) and Luxembourg (600).

*The percentages given in this issue refer to the opinions of Europeans interviewed as part of the Eurobarometer survey.*

*To find out more?*

*"Europeans, science and technology", Eurobarometer 55.2, December 2001.*  
<http://europa.eu.int/comm/research/press/2001/pr0612en.html>

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# Europeans and science

How are European attitudes to science changing? What do people expect from progress in research? What are their fears and doubts in the face of innovations with major implications for the future of society? Daniel Boy analyses the answers to these and other questions raised in the Eurobarometer survey. As research director at the Maison des Sciences de l'Homme in Paris, Mr Boy is currently working on perceptions of scientific and technical progress and the democratisation of scientific choices.

It is almost ten years since the last "Eurobarometer" survey of European attitudes to science. The much discussed divide between science and society does not seem to have closed much. Throughout its history, there has always been the sense that science is in a state of

crisis. The problem is to gauge the extent of this divide, which some see as almost total. A survey of this kind makes it possible to get a sense of proportion and to measure progress. We see that over the years science has remained a fundamental institution in Europe, enjoying a high level of confidence – much higher than politics for example, or the business world or the media.

Scientists have a very strong image in society, but it is an ambiguous one. Researchers possess knowledge, which gives them considerable power. The risks associated with this power then make the public feel it is necessary to control their work more.

#### **Setting aside this need for control, in what way have attitudes changed?**

Science is starting to be perceived as a kind of Pandora's box out of which rather dubious inventions sometimes spring. This feeling has increased over the past 15 years. Thirty years ago, for example, French surveys showed that most people thought science brought more good than bad, whereas today half of those interviewed say that the good and the bad effects are about even. That said, when asking this type of question, one must differentiate between technology and industry. Science is only indirectly responsible for its applications.

Take the example of BSE, where it appears that industry is taking most of the blame. Scientists have been called in and they will be the ones to repair the damage. Fundamental science is going to develop reliable tests and try to understand the disease. Crises of this kind can also strengthen science and its image, as well as the image of public research underpinning this kind of work.

The "Eurobarometer" survey tells us how Europeans feel about science and technology. But then what? Who is going to use this information? And why?

This information is useful. Look at the case of genetically modified plants. For the first time we are seeing a technical innovation coming very fast on the heels of fundamental research. But we are reluctant to make GMOs commercially available quite simply because we know – through surveys – that the public does not want them in their present form. So here we have a scientific crisis even before there are any market sanctions or conflict between environmental organisations, companies and governments. This is a specific example of politicians, industry and research policy-makers having to change strategy due to evident public resistance.

#### **Could this resistance to genetically modified organisms be due to a lack of information?**

These surveys appear to show that information is probably not in itself enough and that it could even have the opposite effect to what is desired. In this respect the questions this survey asks about GMOs reveal something rather interesting. With the models we used previously there was a tendency to believe that the more knowledge people have the more favourable they are to scientific and technological progress. The reality is much more complex. In this case we found that people interviewed could have a high level of knowledge and still believe that biotechnologies should be subject to more control and demand more safety studies, etc.

#### **Despite this particular case, it would seem that knowledge and open-mindedness do more or less go together.**

There is some 'controversy' about this. Industry and research managers believe generally that increased knowledge brings increased support for development. Critics, on the other hand, believe that measures to increase knowledge serve no purpose. The truth no doubt lies somewhere between the two. It all depends on the scientific implications. In some cases knowledge brings approval. In others, and this brings us back to GMOs, we





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have seen that in some countries where there has been initial discussion – based on information made available – it has not necessarily won people over. In some key areas, providing information is not enough to convince or rally support. That seems a perfectly healthy state of affairs to me.

**So what, then, is the argument which will ultimately convince most people?**

Utility. Supposing that the information about genetically modified plants is true, if you then convince the public that a particular variety is drought resistant, can be sold at a low cost to emerging countries, and effectively reduces famine, people will be all for it. Take the mobile phone for example. People talk of the risk, but it has become almost indispensable.

**Do you believe that the replies to questionnaires of this kind will change when Europeans from the “new countries” are also interviewed? We have already seen that former East Germans do not necessarily react in the same way as those in the West?**

The hypothesis is that, as these are countries with a huge desire for industrial development and growth in consumption, they will be enthusiastic proponents of science and technology. This was the case in Spain, Portugal and Greece for a while. A desire for employment and growth can sometimes outweigh worries about risk. To some extent this is true of Finland, which developed late but rapidly and may not yet be thinking of the risks further down the road – damage to the environment, pollution problems, etc. – which people in the older industrialised countries are more worried about. These new countries could therefore strengthen a sense of optimism and confidence in the benefits of science and technology. But that remains to be seen.

**Your survey also refers to the attitudes of young people to science – another factor which could change in an enlarged Europe.**

What is the reason for the lack of interest in science careers in industrialised countries? You can ask young people themselves or the public in general and compare the answers per age group. In this survey, we took various hypotheses as our basis. The first one was that this lack of interest is due to science's

image, which is less positive than it used to be, hence students do not want to pursue careers that have been ‘devalued’. But then we find that science's image is no better or worse among young people than among the public as a whole.

Another hypothesis concerns the appeal of science studies and careers. The studies may seem long, difficult and off-putting, even if there are acceptable professional rewards at the end. A French survey found that 67% of school pupils and university students consider that science lessons are not attractive enough. Teachers themselves admit that course content has not changed for decades and that there is little innovation in teaching methods. The result is that children who study science at school have little desire to pursue the subject any further.

It would seem that this is more the reason why young people are shunning sciences. They prefer other shorter studies, which are seen as being more fun, providing a faster route to a career with relatively less effort. That is perhaps the attraction of the new economy and management. Nevertheless, I believe that today's students, in particular those I see entering university to study human sciences, have a better grounding [in science] than our generation.

**So they could study pure science?**

They could indeed, but it bores them. Young people are much more critical of the teaching they receive than they used to be. University students judge their lecturers and are very demanding. I believe that is what has changed the most. ▶

# Knowledge

## under scrutiny

**"I am interested in science and technology" declare nearly half of all Europeans (45.3%). Yet one in two of them also believe that they are not well informed. While they think they understand certain subjects – those regularly in the headlines, such as BSE or the greenhouse effect – when tested they find it difficult to explain the underlying scientific concepts.**

### Want to find out more?

A fair proportion (15%) of Europeans would certainly like to. This desire for knowledge increases with the level of education and is strongest among men. It is also often most pronounced in countries with a strong tradition of higher education, albeit with a number of exceptions to the rule: 60.9% of Greeks are interested in science and technology compared with 29.8% of Germans.

### The top two: medicine and the environment

As fields which affect their day-to-day lives and receive extensive media coverage, medicine and the environment are the scientific subjects of greatest interest to Europeans. Notably, 60.3% of Europeans are interested in developments in the field of health, especially women (68.4%) and older people (69.5% of the over-55s). Young people are more interested in environmental issues (53.8% of 15- to 25-year-olds), a tendency shared by the most highly qualified (37.8% of those who studied beyond the age of 20).

### The media: TV first

Where do we obtain our knowledge of science and technology? First of all – and by a wide margin – comes television. A majority of the respondents (66.4%) prefer to "watch television programmes on science and technology rather than read articles on this subject", a pattern found throughout Europe, although less markedly in Italy. The written press nevertheless scores well in certain countries (Finland, the Netherlands, Sweden) and among the best educated, who get their information from scientific journals (29.2%) as well as the general press (41.5%).



*29.1% of Europeans say they are interested in science and technology and believe they are well informed. But 48.5% say science leaves them cold. A significant proportion (14.7%) say they are "interested" but "not informed" – revealing a potential knowledge gap. This attitude is particularly common in Greece (25.5%).*

## I N F O R M A T I O N   A N D   M O T I V A T I O N

What motivates Europeans? Five fields were proposed: sport, culture, politics, science and technology, economics and finance. Of those surveyed, 45.3% say they are “rather interested” in science – which ranks third after culture (56.9%) and sport (54.3%). But is it possible to be interested and yet poorly informed? Almost two-thirds of those interviewed consider that there is insufficient access to information on science and technology, in marked contrast to the situation when it comes to sport, culture and politics.



Fewer than one in five Europeans (17.8%) have recently visited a science and technology museum. They are visited less frequently than libraries (30.7%), zoos and aquariums (25.7%), and art galleries (20.9%).

Fields	Well informed	Poorly informed	Rather interested	Not very interested
Sport	57.0	40.5	54.3	44.7
Culture	48.5	47.0	56.9	40.8
Politics	44.3	52.2	41.3	57.0
Science and technology	33.4	61.4	45.3	52.2
Economics and finance	31.9	63.5	37.9	59.8



Radio is the most popular as an information source among older people (29.1%), while the Internet is most favoured by young people and students.

It is the latter that are also most interested in visiting science and technology museums (31%). Their parents are either not interested in this (32.6%) or say they do not have the time (29.2%) or live too far away (11.9%). Visits to science museums are nevertheless a common cultural activity in certain countries and are particularly popular in the Netherlands, Denmark and Sweden.

### A test of knowledge

Is the public's knowledge of science increasing? Not much, to judge from the Eurobarometer 1992 and 2001 surveys in which interviewers used comparable tests.

The 2001 Eurobarometer included a short quiz in which members of the public were asked to answer “true, false, or don't know” to 13 scientific assertions. They were asked, for example, to classify as true or false that “the genes of the father determine whether a baby is a boy or a girl” and that “all radioactivity is man-made”. As these assertions remain largely unchanged from one Eurobarometer survey to the next, they should make it possible to assess the development of knowledge. The conclusion is that there is little change from one survey to the next unless a subject has attracted extensive media coverage during the intervening period. In 2001, for example, there was an increased number of correct replies on the action of antibiotics on viruses (39.7% answered correctly compared with 27.1% in 1992) and on the possible co-existence of human beings and dinosaurs (59.4% compared with 49.9%). The combined effect of media coverage and blockbuster films perhaps?

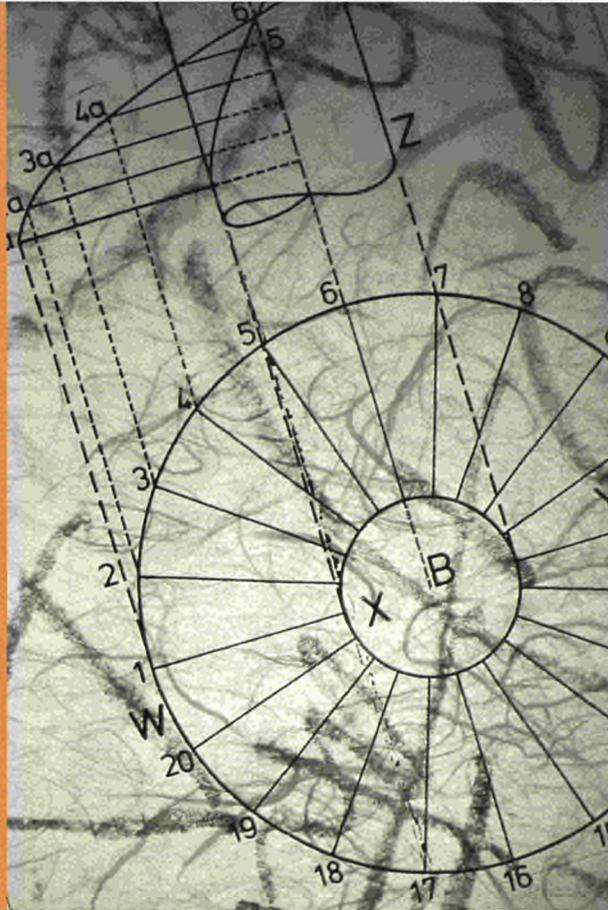
### Attitudes with regard to the various scientific information media (% EU 15)

	Inclined to agree	Inclined not to agree	Do not know
I prefer to watch television programmes on science and technology rather than read articles on this subject	66.4	23.8	9.9
I rarely read articles on science and technology	60.6	33.5	6.0
There are too many articles and programmes on science and technology	18.0	65.8	16.1
Scientific and technological developments are often presented too negatively	36.5	39.1	24.4
The majority of journalists treating scientific subjects do not have the necessary knowledge or training	53.3	20.0	26.7

## Great minds think alike...

Europeans who have pursued lengthy studies or who live in countries with a lively scientific culture (Sweden, the Netherlands, Finland, Denmark) often have shared views on the following points:

- the importance awarded to environmental issues (37.6% of those who studied beyond the age of 20);
- distrust of scientific information provided by the media;
- less hostile to GMOs in regard to health (65.4% would refuse them in their food compared to 70.9% for the general population) but greater acceptance of the view that they could have a negative affect on the environment;
- a desire not to make scientists responsible for the applications of their research (60.5%);
- the attribution of responsibility for BSE (mad cow disease) to non-scientific spheres such as the agri-food industry, politicians or farmers;
- the desirability of allowing foreign scientists to come to Europe to make up for the shortage of scientists.



### The way scientists work

Do Europeans have a clear perception of the way scientists work and the scientific methods they apply? To find out, two examples were given – the way of testing a medicine and the risks of being affected by a hereditary illness – accompanied by three or four possible answers. The results: 36.7% of persons interviewed identified the correct answer in the first case (“the way to test it is by administering a medicine to one group and a placebo to another”) and 68.7% in the second case (“each of a couple’s children has the same risk of having a hereditary illness”). Once again, the best scores were recorded in northern Europe (see the actual questions in the tests on page 16).

Another test involved asking the persons interviewed whether or not they felt they understood topical scientific subjects. The subjects best understood – or at least that was the belief – are air pollution (85.3%), mad cow disease (76.6%), the greenhouse effect (72.9%), holes in

the ozone layer (72.6%) and global warming (72.3%). Genetically modified organisms (GMOs) and the Internet achieved scores of nearly 60%. But, when it comes to medicines developed through genetic engineering and fuel cell engines, the level of understanding is lower (43.5% and 32.7% respectively said they thought they understood them). As to nanotechnologies, they remain a mystery to 67.1% of Europeans.

This question of “avowed” comprehension was followed by a second and more subtle series of “true or false” questions. This exercise revealed that those who said they thought they understood a subject in fact do not appear to understand it any better than those who declared they did not understand it. For example: 55.7% of interviewees wrongly believe that “holes in the ozone layer will cause more storms and tornadoes” where more than 70% of them claim to understand this phenomenon. ▀

### The knowledge index

The 13-question “true or false” test makes it possible to devise a ‘knowledge index’ of correct answers ranging from 0 to 13. The average of this index is 7.8. If it is calculated according to the ages at which people finished studying, a clear link between education and scientific knowledge is revealed. It also shows a difference between countries; people in the countries of northern Europe (Sweden, the Netherlands, Finland, Denmark) being on average better informed and those in southern Europe (Portugal, Greece, Spain) and Ireland less well informed.

### Did you say scientific?

52.7% of Europeans believe that astrology is “rather scientific” compared with just 33.1% for economics and 33.1% for history. The most legitimate and respected of sciences is medicine (92.6%), followed by physics (89.5%) and closely followed by biology (88.2%).

### A certain distrust

A minority of Europeans (26.3%) believe that scientific information is presented too negatively and that journalists lack the necessary knowledge. This feeling of distrust is slightly more pronounced among those who claim they are ‘informed’ about and ‘interested’ in science.

# Hopes and doubts

Do Europeans believe in the virtues of science and technology? Yes, but they lack the confidence held by previous generations that progress will be achieved. Science is not seen as all-powerful. Nor is it seen as existing in an ivory tower. The issues it faces are also in part the concern of the worlds of politics and economics, of which people are more wary.



Science and technology are no longer seen as the panacea for a series of problems many of which Europeans believe must be addressed by other agencies, notably public, social or environmental policies.

More than half of Europeans do not believe science and technology will help eradicate poverty and famine. When told that "thanks to scientific and technological progress, the earth's natural resources will be inexhaustible", 61.3% disagree. A majority (80.5%) believe, however, that scientific and technological progress will help to cure diseases such as AIDS and cancer (80.5%), will bring greater opportunities for future generations (72.4%), or will make our lives healthier, easier and more comfortable (70.7%).

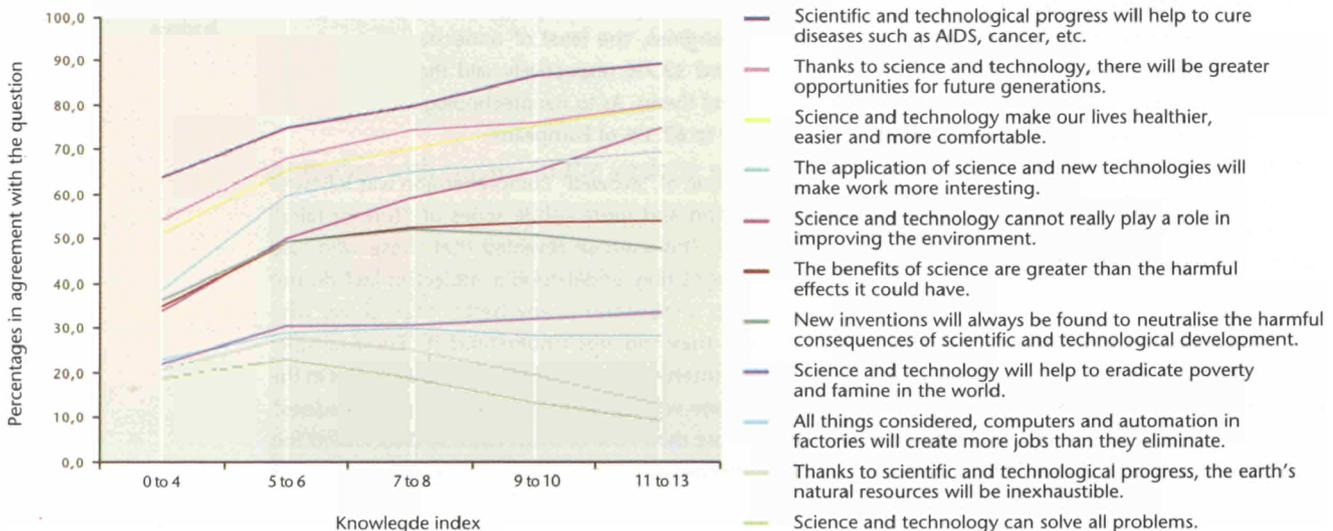
Feelings vary depending on the field: the more interests outside science are involved (economics, politics, etc.), the less confidence there is in progress. Also, reactions of trust and mistrust are more marked the higher the cultural level of interviewees (see graph) and, logically enough, in countries with a higher level of scientific education (the Netherlands, Denmark, Sweden).

## Basic and applied research

This scepticism does not stop Europeans from awarding importance to basic research, both for the development of new technologies (83.2%) and to "achieve progress in knowledge" (75%). In this respect, even if research "does not bring immediate benefits" it is "necessary and should be supported by government".

Opinions are divided on the benefits of applied research. Half of the respondents (51.5%) believe that "many high-tech products are only gadgets". But they certainly do not think this applies to technology such as the Internet which is seen as essential for the development of new economic activities (56.2%). And will the Internet improve the quality of life? Here, not so many are convinced. Among the minority of converts, young men (60.1% of 15- to 25-year-olds) and an educated public (43.5% of those who have pursued lengthy studies) dominate – see graph. ▶

Opinions on the impact of science according to level of knowledge



# Among the young

**Children like science. But interest seems to wane as they grow older. This is of great concern to many teachers who are now developing active educational methods giving pride of place to practical experimentation. One-quarter of Europeans would approve of this initiative as they believe that “science lessons at school are not appealing enough” – the main reason given for the disaffection of younger generations.**

The number of students choosing to study science subjects has been declining steadily over recent years in most European countries. Science would seem to have fallen from grace. But why? Four explanations were proposed. Two relate to the studies (*boring lessons, difficult subjects*), two to career prospects (*work not interesting, salaries and career prospects not sufficiently attractive*) and a third suggests that ‘science has too negative an image in our society’.

Just 31.4% of respondents in fact believe that this poor image is the reason for the disaffection. The main cause is seen as lying in the scientific studies themselves. Over half (59.5%) of Europeans believe that “science lessons at school are not attractive enough”. Next comes the difficulty of science subjects, cited by 55%. The two reasons linked to employment – inherent interest of scientific careers and salary/career prospects – score 49.6% and 42.5% respectively.

But do young people react in the same way as Europeans in general? Yes, or so it seems from the answers of respondents still studying. There is just a slight difference when it comes to the question of material benefits, with 40% of young people (compared with 41.8% for the population as a whole) taking these into account.

## Is it really so serious? And for who?

A second set of proposals concerned the consequences of this disaffection (see table) and ways of responding to it. In fact it seems that people are not particularly concerned by this phenomenon (a majority did not subscribe to the view that “it is a serious threat to future socio-economic developments”). Logically enough, they believe that there will always be enough skilled people to meet the demand (proposition 2). Yet this overall optimism does not prevent them (60.3% – a high score) from wanting government policies to reverse the trend.

Encouraging women to pursue scientific studies and careers and opening up to foreign scientists were the most popular solutions to the problem. The former was favoured in general – but rather less so by the young –



## Why are young people shunning science subjects?

	Opinion of young people still studying (*)	Opinion of respondents as a whole	Deviation
Science lessons are not appealing enough	67.3	59.5	7.8
Science subjects are too difficult	58.7	55.0	3.7
Young people are not so interested in science subjects	53.4	50.2	3.2
Salaries are not attractive enough	40.0	41.8	-1.8
Science has too negative an image	34.0	31.4	2.6

(\*) The figures could be proportionally higher among young people as respondents as a whole could choose the “don’t know” option and preferred spontaneously to answer “none” or to give other reasons.

(70.8% for the sample as a whole and 66.8% for girls still studying) while the latter was backed by those with a high level of knowledge (70.1%) and senior executives (72.3%).

Scientists are men and women whose knowledge brings them power. They are a very special professional group over whose activities – due to their ethical implications – society must exercise strict control. Such are the feelings of a majority of Europeans. But when it comes to determining the share of responsibility researchers must bear for the uses made of their discoveries, they are much more divided in their views.

# Role and accountability

*The idea of constraint is found everywhere, even where the most confidence in scientists could have been expected, for example among those with a high level of knowledge.*

"Gravity cannot be held responsible for the fact that one falls in love," said Einstein. This could be taken to mean that scientists cannot control and monitor the applications of their research. Seven proposals on this sensitive issue were put to Europeans. The first – "as members of society, scientists share in the responsibility of any use, good or bad, of their discoveries" – was widely subscribed to (69.1%). The second – "scientists are responsible for the misuse of their discoveries by others" – which places a greater burden of responsibility on scientists as possessors of knowledge as distinct from other citizens, elicited a divided response, with two roughly equal blocks 'for' and 'against' but also with cultural and geographical differences. Although 42.3% overall disagree with this idea of 'blanket' responsibility, 60.5% of the most educated reject the notion, as do a majority of people in northern Europe.

## Science and ethics

When presented differently, the responsibility of scientists prompts different responses. A large majority of Europeans (84.4%) believe that a discovery in itself is neither good nor bad. Here, as so often is the case, it is the use to which it is put that matters.

When confronted with ethical issues in more concrete terms, namely the example of animal experimentation, differences are along the lines of gender and political convictions: just over half of men (50.6% compared with 40.6% of women) accept experimentation – as do the majority (55.4%) of those who put themselves on the right of the political spectrum.

Control and respect for ethical standards, evoked in the last two proposals, meet with wide support. Social control is seen as a good thing, irrespective of cultural class (85%

## Responsibilities and accountability of scientists

	Inclined to agree	Inclined not to agree	Don't know
As members of society, scientists share in the responsibility of any use – whether good or bad – of their discoveries	69.1	18.4	12.5
Scientists are responsible for the misuse of their discoveries by others	42.8	42.3	14.8
Scientists' knowledge gives them a power which makes them dangerous	63.2	24.8	12.0
A discovery in itself is neither good nor bad. What is important is the use which is made of it	84.4	8.1	7.5
Scientists should be allowed to carry out experiments on animals such as dogs and monkeys if that can help solve human health problems	45.4	41.3	13.3
The authorities ought to formally oblige scientists to observe ethical rules	80.3	8.3	11.3
Scientists ought to be free to pursue their research as they wish so long as they observe ethical rules	73.5	14.7	11.8



# of scientists

of respondents with a high level of knowledge are “inclined to agree”). However, 73.5% of Europeans consider that “scientists ought to be free to pursue their research as they wish so long as they observe ethical rules”.

## Who to trust?

Who, finally, should we believe? And who can be trusted in the event of a disaster? To find out, Europeans were asked to give their verdict on a dozen professions (see table).

Science and technology have a good image, as the three professions held in the most esteem are those with a scientific and technical dimension: doctors (clear leaders with a 71.1% rating), followed by scientists (44.9%) and engineers (29.8%). The former are the favourites of older people (78% among the over-65s), the French and the British. The two latter categories are favoured by respondents with a high knowledge index. Scientists are particularly appreciated in

Sweden, Denmark, Greece, The Netherlands and Luxembourg.

Among the less trusted are journalists and businessmen (and -women), to a more or less equal extent at 13.5% and 13.6% respectively. Finally, there are the politicians, with on average just 6.6% of the confidence vote, but with a somewhat better score in Luxembourg, the Netherlands and Denmark.

When Europeans are asked who they would trust most in the event of a disaster in their immediate neighbourhood or district, it is scientists first, followed by doctors. The former receive most support among people who have pursued lengthy studies, as well as in Denmark and Greece (74.7% and 83.4%). The latter are chosen more by elderly people. Environmental protection and consumer associations both inspire a good level of trust, with politicians and journalists some way behind, and businessmen clearly trailing the field.



## Women and science

Although the questions in the Eurobarometer survey were not specifically designed to highlight gender patterns, some answers do show differences between the opinions of men and women irrespective of national and cultural characteristics.

As a general rule, women are less interested in science and technology (39.6% say they are interested, compared with 51.5% of men). They are, however, interested in certain fields, such as medicine and the environment (68.4%).

They are also more clearly hostile to certain aspects of science than their male counterparts. This is true of genetically modified organisms (GMOs) and – even among the youngest

(68.1% of 15- to 24-year-olds compared with 60.7% among boys of the same age) – animal experimentation.

As regards the scientific “vocation”, and the need to encourage more women to study and teach these subjects, A noteworthy 70.8% of interviewees say they are favourable to this. Strangely though, younger women are the least convinced (66.8% of women students).

Lastly, of all Europeans it is the Italians who seem to be least enthusiastic about the idea of seeing their women opt for sciences (59.4% compared with 70.8%, on average, of all the respondents).

## For which of the following professions do you have most esteem?

	B	DK	D	GR	E	F	IRL	I	L	NL	A	P	FIN	S	UK	EU15
Doctors	74.3	58.9	64.4	68.0	68.0	80.4	69.6	67.4	79.2	72.2	65.2	76.5	76.0	73.9	78.0	71.1
Scientists	48.5	50.1	42.7	53.3	47.4	47.9	22.9	46.4	50.1	50.0	36.2	35.2	43.5	54.8	40.9	44.9
Engineers	31.5	28.7	26.6	24.7	32.1	33.8	24.3	27.1	31.9	29.2	16.5	26.4	27.5	24.5	36.3	29.8
Judges	21.3	41.9	35.5	26.0	20.9	20.0	24.0	23.3	32.5	39.1	29.0	30.4	26.3	37.4	27.2	27.6
Sportsmen	30.5	14.7	16.8	49.1	32.8	26.3	35.0	19.3	22.5	27.5	23.1	22.3	17.1	12.9	23.3	23.4
Artists	32.2	19.2	16.4	31.8	25.8	30.3	13.4	29.8	26.4	29.6	13.7	24.9	25.6	17.5	14.8	23.1
Lawyers	17.4	21.3	21.1	17.5	15.2	15.4	16.2	12.5	20.3	24.7	15.6	15.5	14.0	20.3	22.8	18.1
Journalists	20.3	8.8	8.6	24.4	26.7	17.6	14.1	12.3	26.8	15.9	8.1	25.8	10.0	9.3	5.0	13.6
Businessmen	17.8	11.9	9.0	14.5	16.0	10.6	18.4	18.1	17.1	13.7	16.0	15.6	18.6	11.2	14.6	13.5
None of these	4.7	7.9	8.9	6.5	8.0	5.6	6.2	6.7	3.6	7.6	9.1	4.8	4.0	6.9	5.1	6.9
Politicians	8.7	13.1	7.8	5.8	6.2	3.2	6.1	4.5	16.8	14.9	8.7	5.9	7.1	9.8	6.3	6.6
Don't know	2.6	3.0	3.5	0.4	4.2	1.5	5.5	2.5	2.8	3.4	3.4	3.3	2.0	2.7	3.6	3.0

## BSE: Who's to blame?

What better illustration of accountability than the BSE or mad cow crisis? Who was responsible? Four possibilities were presented: the agri-food industry, politicians, farmers and scientists.

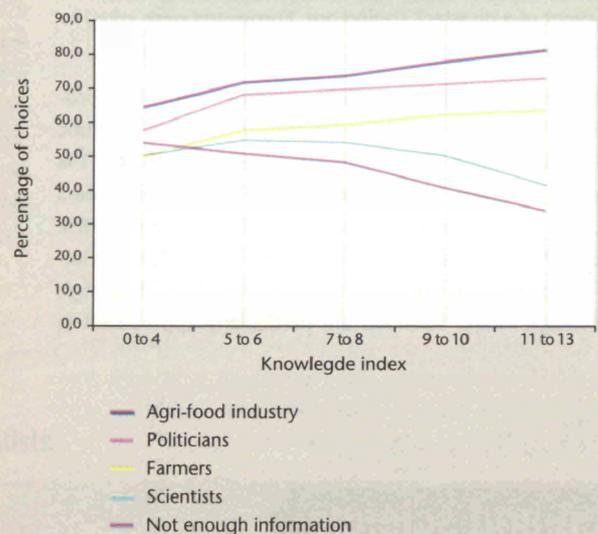
When asked to consider what share of responsibility these actors bore, respondents pointed the finger first at industry (74.3%), closely followed by politicians (68.6%). Farmers (59.1%) and scientists (50.6%) were deemed to be much less responsible. Many Europeans (44.6%) nevertheless felt they did not have enough information to apportion blame.

This BSE question is highly indicative of the way researchers are viewed and revealed significantly different views depending on level of knowledge (see graph). The higher the knowledge level, the more industry, politicians and farmers are seen as culprits and the least blame is attached to researchers. Logically enough, it is among the most educated that there are least complaints of not having enough information on the subject.

To complete the analysis, four possible solutions to problems of this kind were put to respondents. A very large majority of them subscribed to the view that:

- Scientists ought to keep us better informed about the possible hazards of certain scientific or technological advances (89%);
- Scientists ought to better communicate their scientific knowledge (85.9%);
- Industry ought to be better regulated (82.4%);
- Politicians ought to rely more on the opinion of scientists (72%).

### Responsibilities in the mad cow disease affair according to knowledge index



Although it would appear difficult to disagree with these proposals, it is interesting to note how widely held the view is that scientists should warn the public. Differences of opinion are evident in the proposition concerning the agri-food industry: senior executives are more likely to reject this notion that it should be better regulated (13% compared with 7.7% average) as are the citizens of certain countries, usually the Nordic countries, and especially Sweden (30.4% contest it).

# A special field

Europeans are certainly not very keen on genetically modified organisms (GMOs), a field in which they demand the right to choose. They want to be better informed, to know more about their use in food and to know what scientists think about whether or not they are harmless.

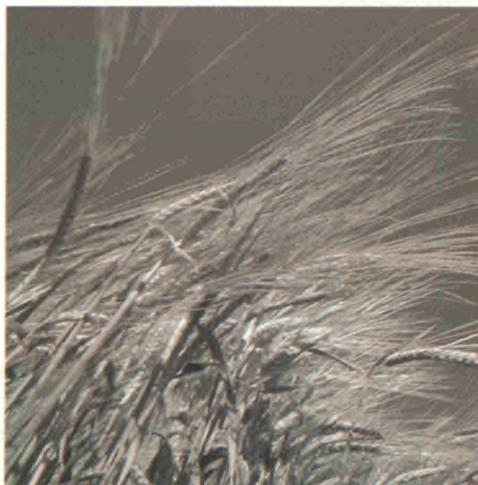
Is food containing GMOs harmful to health? One-quarter of Europeans are unable to say one way or the other. A majority of them nevertheless believe that GMOs can pose a threat (56.4%). This group of opponents includes approximately the same number of citizens who state they are well informed (59.9%) as against poorly informed (53.2%): 58% of those who left school at 15 or under distrust GMOs, a sizeable (53.2%) proportion of those who stayed at school beyond the age of 20 having the same doubts. Such shared opposition, very rarely found in answers to other questions, is characteristic of the particular importance of GMOs, especially where human food is concerned.<sup>(1)</sup> It is also important to note that, setting aside GMOs, 59% of Europeans believe that "science and technology will improve agriculture".

## The right to choose

The 2001 survey provided a deeper insight into opinions on this very controversial subject by measuring the response to a number of propositions, mainly relating to consumer freedom and information and the potential dangers of GMOs. The first of these assertions ("I want to have the right to choose") met with record approval: 94.6% of Europeans want to be able to decide for themselves. 85.9% of them also want sufficient information ("to know more about this kind of food before eating it"), while just as many believe that GMOs "should only be introduced if it is scientifically proven that they are harmless" – which can also be interpreted as an expression of confidence in science.

## Food and the environment

Nevertheless, distrust remains the dominant feeling: 70.9% of those interviewed reject this kind of food, compared with 14.6% who consider that it does not present "any particular danger". Among the more educated people the distrust level "falls" to 65.4%. It is also a view less widely held by young people: 64.3% of 15- to 24-year-olds (compared with 74.8% of the over-65s), especially young men (60.7% reject GMOs compared with 68.1% of women in the same age group). Strangely, the Dutch and the Portuguese are most likely (23.1% and 24.3% respectively) to consider that these products pose no risk.



15- to 24-year-olds are less hostile to GMOs than older people. If this is due to a generational effect by which young people are more used to technological innovation, then this sentiment is likely to persist. If, on the other hand, it is an age group phenomenon, young people being naturally less sensitive to risk than their elders, then one should not expect any dramatic change in the overall attitudes of society to GMOs.

59.4% of those interviewed believe that transgenic plants could "have negative effects on the environment". This view varies according to the level of knowledge – the higher it is the greater the agreement.

The pros and cons of GMOs nevertheless remain something of a mystery for a relatively large number of Europeans, and the proportion of "don't knows" is not insignificant: 30.6% for the potential risk in general and 28.7% for negative effects on the environment.

<sup>(1)</sup> In his interview, Daniel Boy stresses (see pages 3 and 4) the specific problem of GMOs on which opinions differ in regard to information and knowledge.

## GMOs could have negative effects on the environment\*

Level of knowledge	Inclined to agree	Inclined not to agree	Don't know
0 to 4	47.7	9.4	43.0
5 to 6	57.1	11.9	31.0
7 to 8	60.3	11.6	28.1
9 to 10	61.1	13.2	25.6
11 to 13	66.0	11.9	22.1
Total	59.4	11.9	28.7

(\* ) Analysis of answers according to level of knowledge (% EU 15)

# At the dawning of the ERA

As the European Research Area (ERA) takes shape, what do Europeans think of European research policy? What is the added value of joint research carried out in several countries? In what areas is the Union actively involved? What impact can we expect enlargement to have on scientific potential?

## Perception of the Union's activity in different areas: perceived reality, wishes and the deviation between the two (% EU 15):

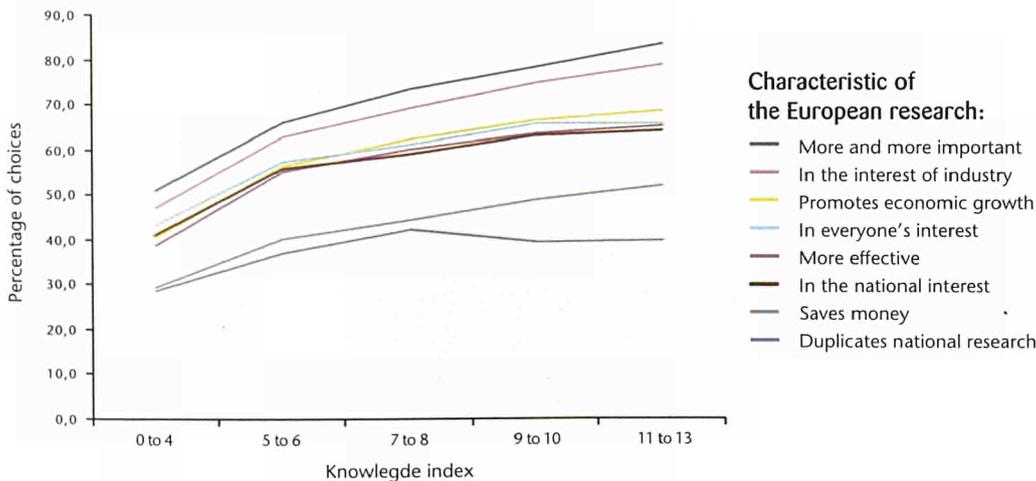
	Perception	Wish	Deviation
Consumer protection	28.9	77.6	48.7
Employment, social affairs	28.8	71.7	42.9
Energy	33.0	75.5	42.5
Research (S&T)	38.2	80.2	42.0
Environment	50.7	86.4	35.7
Regional development	22.4	56.4	34.0
Foreign affairs	44.6	72.2	27.6
Defence	41.5	68.7	27.2
International trade	53.5	77.6	24.1
Agriculture	59.2	80.5	21.3

Europeans do not seem to know a great deal about the EU's areas of competence. Out of ten areas proposed, only three were quoted by more than half the respondents: agriculture, international trade and the environment. Just 38.2% identified science and technology as an EU area of competence. The higher the age when studies were completed, the more likely people were to attribute competence to the EU.

At the same time it seems that Europeans would like to see Europe become more involved in a number of fields, such as consumer protection, employment and social affairs, energy – and also science. They would like the Community to have more powers to intervene in all these areas.

But how? How, for example, can the level of research be improved in Europe? When interviewees were given a list of possible actions, they showed a clear preference for better organisation rather than increased investment.

## Compared qualities of research carried out at national or European level according to knowledge index



# National perceptions

How do individual EU countries perceive science and technology, scientific culture, the importance awarded to science subjects at school, ethical issues and the role of researchers? We take a brief look at each country in turn, highlighting the differences – big and small – to reveal how each one varies from the “norm”.

## Austria

Most critical of the world of knowledge: 33.1% think schools and universities are the least important source of information about scientific developments (EU: 20.6%).

## Belgium

Among the least opposed to GMOs: 19% feel their presence in food poses no particular threat to health (EU: 14.6%).

## Denmark

Best informed about science and technology (51% believe they are well informed, compared with EU average of 33.4%).

High expectations of research: 94.1% of Danes believe that scientific and technical progress will help find a cure for illnesses such as AIDS and cancer (EU average: 80.5%).

## Finland

High expectations that science and technology could help eradicate poverty and hunger (43.6% compared with an EU average of 30.4%).

Low awareness of EU research policy: just 18.4% of Finns know that the Union is involved in this field (EU: 38.2%).

## France

Limited confidence in scientists: just 56% would trust them to explain the reasons for a disaster (EU: 62.7%). 75.4% feel that because of their knowledge scientists exercise a potentially dangerous power (EU: 63.2%).

Positive attitude to research coordination: 87.4% want to see more co-operation between Member States (EU: 80.4%).

## Germany

The lowest interest in science and technology (66.6% pay little attention to it, compared with 52.2% in the Union).

Positive attitude to European research: 64.7% feel it is more effective than research at national level (EU: 58.2%).

The new Länder are among the most positive about enlargement: 82.5% feel it will enhance the scientific and technological potential of the current Member States (EU: 53.3%).

## Greece

Very concerned by ethical issues: 90.3% of Greeks believe the authorities should oblige scientists to respect ethical standards (compared with 80.3% in the EU). 70.1% feel they are responsible for the uses – including misuses – to which their discoveries are put (EU: 42.8%).

They believe that scientists bear a major share of responsibility for BSE (84.8% compared to 50.6% for EU), and are strongly opposed to GMOs: 93.3% say they do not want this type of food (EU: 70.9%).

66.8% believe that research at European level is more effective than at national level (EU: 58.2%).

60.9% say they are interested in science and technology, while 25.5% (EU: 14.7%) say they are “interested” but “poorly informed”.

## Ireland

The lowest number of visits to science and technology museums: 4.1% compared with 11.3% in the EU.

The lowest level of confidence in scientists (22.9% compared with 44.9% in the Union).

## Italy

59.4% of Italians believe more women should take up studies and careers in science (EU: 70.8%).

They have a high regard for European research and believe it is more effective than at national level (65.1% compared with 58.2% for the EU).

## Luxembourg

65.8% are particularly interested in the environment, a record compared with the EU average of 51.6%.

## Portugal

The Portuguese are the least well-informed about science and technology (73.2% compared with 61.4% in the Union) and, logically, get the least pleasure from reading about the subject (78% say they read few articles on the subject, compared with 60.6% in the Union).

Positive attitude to the Internet, believing it has the potential to improve the quality of life (50%, compared with 39.4% in the Union).

Just 18.3% of Portuguese know that the EU is involved in research (EU: 38.2%).

## Spain

Positive attitude to enlargement: 61% believe it will bring an ‘added value’ to the scientific and technological potential of the current Member States (EU: 53.3%).

## Sweden

64.3% of Swedes say they are interested in science and technology, compared with 45.3% in the EU. 19.4% say they visit science and technology museums regularly (EU average: 11.3%).

They trust scientists: 68.6% do not hold them responsible for the misuse of their discoveries, compared with 42.3% for the EU.

Are they technophobes? 72.5% believe that most high-tech products are no more than gadgets (51.5% in the EU).

Are they Eurosceptics? So it would seem as far as European research is concerned: 38.3% believe it is less effective than research at national level (EU: 18.6%).

## The Netherlands

The Dutch are the most interested in the Internet (47.9% compared with 27.9% in the EU) and among the least opposed to GMOs. 52.6% of them do not want them in their food, compared with 70.9% in the EU).

## United Kingdom

The British are critical of the EU’s role. Just 66.8% want to see the EU involved in the fields of science, technology and research – compared with 80.2% in the Union.

# Are you an average European?

These tests or quizzes were submitted to Europeans as part of the "Eurobarometer" questionnaire. Now it's your turn...

## I. TRUE OR FALSE?

Here are 13 statements and the percentage of answers given by the people interviewed. Who is right? Here is your chance to test your knowledge and compare your performance with the European average. Note that the first four proposals are considered to be the most difficult to answer and the last four the easiest.

	True	False	Don't know
1. Lasers function by making sound waves converge	26.6	35.3	38.1
2. Antibiotics kill viruses as well as bacteria	41.3	39.7	19.0
3. Electrons are smaller than atoms	41.3	23.0	35.7
4. The genes of a father determine whether a baby is a boy or a girl	48.1	30.2	21.6
5. All radioactivity is man-made	26.5	52.6	20.9
6. The Earth goes round the Sun in a month	22.9	56.3	20.9
7. The first human beings lived at the same time as the dinosaurs	20.3	59.4	20.3
8. Radioactive milk can be made healthy by boiling it	11.8	64.2	24.0
9. The Sun turns around the Earth	26.1	66.8	7.1
10. Human beings have evolved from older animal species	68.6	16.6	14.8
11. The oxygen that we breathe comes from plants	79.7	13.6	6.7
12. The continents have been moving for millions of years and will continue to move in the future	81.8	5.5	12.7
13. The Earth's core is very hot	88.4	3.5	8.1

## II. DECIPHERING THE MEDICAL MESSAGE

Suppose doctors tell a couple that their genetic material is such that they have a one-in-four chance of having a child affected by a hereditary illness. Does this mean that:

1. If they have only three children, none will have the illness.
2. If their first child has the illness, the next three will not.
3. Each of their children has the same risk of having the illness.
4. If their first three children do not have the illness, the fourth will.
5. Don't know.

## III. IMAGINING SCIENTIFIC METHODS

A scientist wants to know whether a particular medicine is effective in combating a disease for which there is no prevention, diagnosis or treatment. Which do you think is the most correct scientific approach to test the effectiveness of the medicine?

1. Administering this medicine to 1 000 people suffering from this disease to see how many show signs of recovery.
2. Administering this medicine to 500 people suffering from this disease and asking another 500 people not to follow the treatment to see which of the two groups contains more people showing signs of recovery.
3. Administering this medicine to half of the people and treating the other 500 with a placebo which is harmless but looks identical in order to see which of the two groups contains more people showing signs of recovery.
4. Don't know.

Answers  
True/false : True: questions 3, 4, 10, 11, 12, 13  
False: questions 1, 2, 5, 6, 7, 8, 9  
Deciphering the medical message:  
Correct answer: 3  
Imagining scientific methods:  
Correct answer: 3

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